

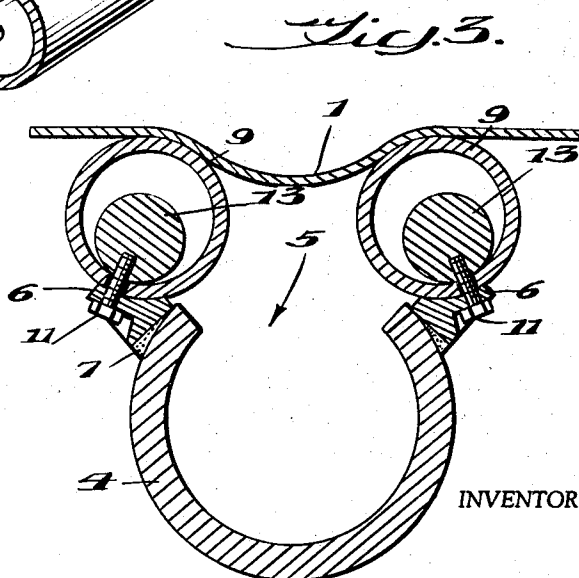
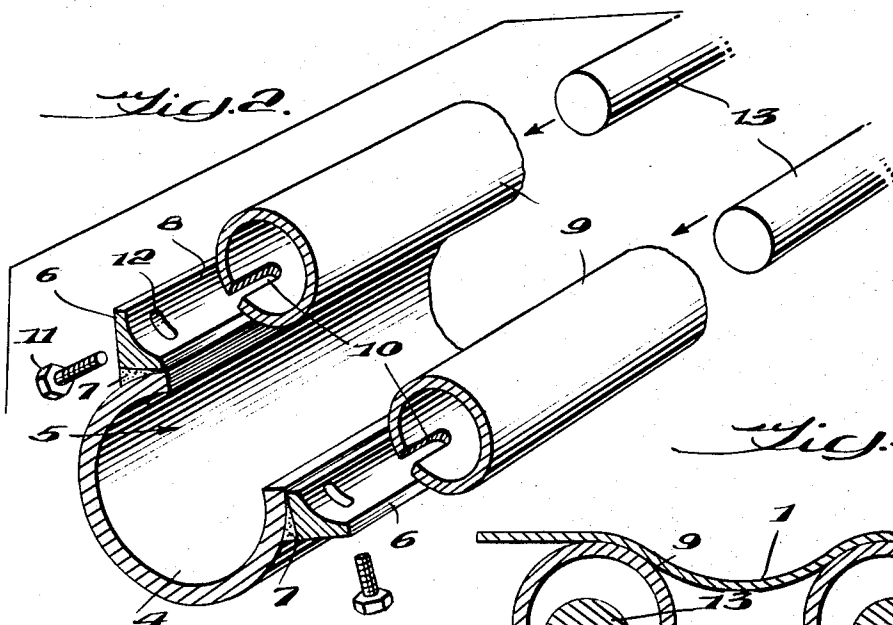
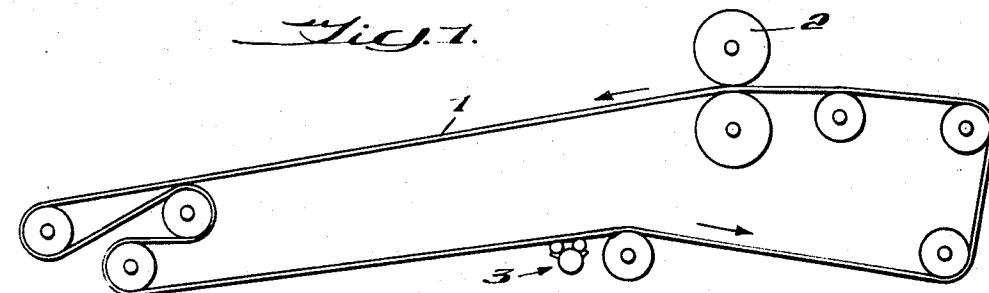
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E. D. KWASNIEWSKI ET AL

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FELT CLEANER FOR PAPER MAKING MACHINE

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INVENTORS

EDWARD D. KWASNIEWSKI
HOWARD E. BARTON

BY

K. W. Brownell

ATTORNEYS

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FELT CLEANER FOR PAPER MAKING MACHINE
Edward D. Kwasniewski, West Seneca, and Howard E. Barton, Far Rockaway, N.Y., assignors to The Carborundum Company, Niagara Falls, N.Y., a corporation of Delaware

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7 Claims

ABSTRACT OF THE DISCLOSURE

A device for cleaning a felt fabric employed in a paper making machine comprising a suction box having a slot therein with tubular members on opposite sides of the slot. The tubular members, which are in direct contact with the felt fabric, are composed of a hard dense ceramic material to preclude damage to the felt fabric while effectively permitting the extraction of water therefrom and the attendant dirt and foreign matter.

This invention relates to improvements in felt cleaners for paper making machines.

In a paper making machine, such as for example as a Fourdrinier machine, after the wet web of paper pulp fibers has been collected on the wire screen and a large amount of water withdrawn from the web, the latter is directed off of the wire screen onto an endless felt blanket which conveys the wet sheet of paper pulp to the calender rolls. The web is supported on the felt during the calendaring operation and additional water is extracted therefrom. The felt cleaner is used in the press section, which in general is between the Fourdrinier or other forming device, and the dryer section. A detergent or wetting agent may be injected into the felt ahead of the felt cleaner. In the course of extraction of the water from the paper sheet and any additional water that has been added, dirt and foreign matter, often in the form of hard particles, may be deposited in the felt and the felt also is subjected to a compacting action as it passes between the calendaring rolls.

Various attempts have been made heretofore to provide felt cleaners for conditioning the felt. Such conditions as have been employed often cause excessive wear of the felt which is usually made of soft wool material, thereby requiring frequent replacement of the felt at considerable expense. Moreover, the felt cleaning devices, as have been available, often cause damage to the felt by cutting and scraping.

One object of this invention is to improve the construction of cleaning devices for the felt of a paper making machine and to overcome the foregoing objections.

Another object of the invention is to provide wear surfaces for the felt conditioning devices which not only will avoid damage to the felt but will also reduce the drag load over the wear surfaces and thereby lower power requirements for movement of the felt rectilinearly.

Still another object of the invention is to provide for the use of hard ceramic material such as dense silicon carbide for the wear surfaces of felt conditioning devices, which are in contact with the felt and exposed to excessive wear.

These objects may be accomplished, according to one embodiment of the invention, by providing a suction box or pipe for an endless felt of a paper making machine, with one or more contact surfaces in position to bear against the surface of the felt and formed of a dense silicon carbide or other suitable ceramic material. This ceramic material may be in the form of one or more tubes bearing against the surface of the felt and which

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is secured by suitable clamp means on a suction pipe into and through which water can be extracted with a sufficient air flow to fluff the felt and improve the characteristics thereof.

This embodiment is illustrated in the accompanying drawings, in which:

FIG. 1 is a diagrammatic side elevation of a portion of a paper making machine to which the invention may be applied;

FIG. 2 is a disassembled perspective view of portions of the felt conditioning device; and

FIG. 3 is a cross section therethrough.

Referring to FIG. 1 of the drawings, the numeral 1 illustrates the forming felt of a paper making machine onto which the web of paper pulp is received from the forming apparatus, such for example as a Fourdrinier wire screen. The wet web is deposited initially onto the top reach of the felt 1 and usually it passes between press rolls such as those generally designated at 2 and which serve not only to remove water from the web but also for surfacing the latter.

It is also desirable to apply to the felt at some point in the length thereof suitable conditioning means. The conditioning means frequently includes provisions for spraying water onto the surface of the felt to effect loosening of dirt and foreign matter therefrom and the application of suction therethrough to maintain a flow of air which will fluff the felt and aid in removing the water.

Felt conditioning devices are available in many designs, such as suction boxes, felt conditioning shoes, Uhle boxes, Scofield venturi, etc. All of these have wear surfaces in contact with the felt and the invention may be applied thereto, as exemplified herein.

In this example, the invention is shown as applied to a suction box, generally designated at 3 in FIG. 1 and shown more in detail in FIGS. 2 and 3. The suction box 3 is shown in connection with the bottom reach of the felt 1, although it may be applied to any part of the felt as found desirable. There may be several suction boxes of various sizes used with a single felt.

The suction box 3 comprises a suction pipe 4 which extends from side-to-side of the felt and has a slot 5 in one side thereof toward the felt, which slot 5 is open throughout the width of the felt. The suction pipe 4 is connected with suitable means for applying suction thereto and usually would be closed at one end or at both ends according to whether the suction means is connected therewith at one end or intermediate the ends of the pipe. A suitable metal or plastic pipe may be used for this purpose.

Extending along opposite sides of the slot 5 are shoulder members, such as bars 6, which are permanently secured to the outer surface of the pipe 4 by suitable means, such as welding, soldering or the like, indicated generally at 7. The shoulder members 6 are provided with concave or other suitable seats 8 on the inner surfaces thereof toward the slot 5, upon which tubes 9 are seated. The tubes 9 are slotted at intervals, as indicated at 10, to receive screws 11 therethrough and through slots 12 in the bar 6.

The screws 11 extend into rods 13 which are provided with drilled holes for receiving the ends of the screws 11. The screws 11 and rods 13 form means for clamping the tubes 9 in place at opposite edges of the slot 5 in position to bear upon the undersurface of the bottom reach of the felt 1 when the felt conditioner is used in the position shown in FIG. 1.

The parts 4, 6 and 13 may be formed of brass or stainless steel, or other suitable material. However, the tubes 9 should be formed of a suitable ceramic material that is hard and dense, such as dense silicon carbide. A high density self-bonded silicon carbide will reduce to a mini-

num wear of the felt, as well as the drag load of the felt over the wear surface, thereby lowering the power requirements for moving the felt. The dense ceramic material may be polished, if required, and will have a low coefficient of friction on the felt. It will also reduce the danger of cutting or scraping the felt.

Monel metal may be used for the tubes 9, although it is soft and has poor wear characteristics as compared with dense silicon carbide, which is required. Also suitable are the hard, dense, metal-bonded ceramics, such as chromium-bonded alumina, and hard, dense impregnated ceramics, such as zirconium diboride impregnated with molybdenum disilicide. Other specific hard, dense ceramics which can be used include titanium carbide, boron carbide, tungsten carbide, zirconium carbide, titanium boride, zirconium boride, titanium nitride, zirconia, alumina, nitride-bonded silicon carbide, metal-bonded titanium carbide, and metal-bonded tungsten carbide.

Other materials may be used for the rods 13, such as Teflon. These rods should have sufficient strength to reinforce as well as to clamp the tubes 9 in place during the operation in connection with the felt.

It is apparent that by the use of this invention, the useful life of the felt is materially increased, as well as the life of the felt conditioning device. Maintenance costs are materially reduced and power requirements for operation of the felt are likewise reduced.

While the invention has been illustrated and described in one embodiment, it is recognized that variations and changes may be made therein without departing from the invention as set forth in the claims.

We claim:

1. In a paper making machine having a forming felt adapted to receive a web thereon, a suction box having a slot therein, tubular members on opposite sides of the slot in bearing relation with the felt, said tubular members having openings in the walls thereof, clamping members inside the tubular members, and fastenings connected with the suction box and extending through the openings into engagement with the clamping members for holding the tubular members on the suction box.

2. In a paper making machine having a forming felt adapted to receive a web thereon, a suction box having

a slot therein, tubular members on opposite sides of the slot in bearing relation with the felt, said tubular members having openings in the walls thereof, clamping members inside the tubular members, and fastenings connected with the suction box and extending through the openings into engagement with the clamping members for holding the tubular members on the suction box, each of said tubular members being formed of a dense ceramic material.

3. A suction box as set forth in claim 1 in which the portion of said box in contact with the felt is formed of an impermeable ceramic material having a hardness of at least 7 on Mohs' scale.

4. A suction box as set forth in claim 1 in which the portion of said box in contact with the felt is formed of a dense ceramic material.

5. A suction box as set forth in claim 4 in which said dense ceramic material is selected from the group consisting of silicon carbide, titanium carbide, boron carbide, tungsten carbide, zirconium carbide, titanium boride, zirconium boride, titanium nitride, zirconia, alumina, nitride-bonded silicon carbide, metal bonded titanium carbide, metal-bonded tungsten carbide, chromium-bonded alumina, and zirconium diboride impregnated with molybdenum disilicide.

6. A suction box as set forth in claim 4 in which said dense ceramic material is dense silicon carbide.

7. A suction box as set forth in claim 4 in which said dense ceramic material is alumina.

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S. LEON BASHORE, *Primary Examiner*.

A. C. HODGSON, *Assistant Examiner*.

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